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Agricultural Memorandum No. 428

Release of Barley Mildew Spores - Diurnal Variation

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PART 1 - Wellesbourne

Counts of spore catch at Wellebourne in 1971 were available on a 2-hourly basis. For a first approximation to the diurnal variation, simple averages were taken for May and June separately. (May 30 omitted, having an incomplete count).
A second attempt was made allowing for the effect of wind direction. Based on Ag. Mem. 427 the following corrections were made, using Elmdon 6 hourly wind data:-

May		June	
020-080 winds	Halve	020-080 winds	Halve
090-250 winds	Double	090-130 winds	Double
260-010 winds and calm	No Change	140-010 winds and calm	No Change

Although no allowance was made for temperature, the above corrections probably allow for some temperature effect.

Results

May

Time of day (B.S.T.)	Mean catch	Percentage of total	Mean adjusted catch	Percentage of total
0900-1100	198	24	156	20
1100-1300	115	14	97	12
1300-1500	48	6	49	6
1500-1700	69	8	67	8
1700-1900	16	2	23	3
1900-2100	19	2	25	3
2100-2300	17	2	21	3
2300-0100	40	5	38	5
0100-0300	49	6	61	8
0300-0500	67	8	65	8
0500-0700	80	10	74	10
0700-0900	110	13	106	14

Thus nearly half the catch appears to be obtained between 0700 and 1100 hours and least spores are caught between 1700 and 2300 hours.

June

Time of Day	Mean catch	Percentage of total	Mean adjusted catch	Percentage of total
0900-1100	158	12	121	12
1100-1300	184	14	149	14
1300-1500	142	11	112	11
1500-1700	72	5	58	6
1700-1900	44	3	38	4
1900-2100	42	3	35	3
2100-2300	63	5	53	5
2300-0100	103	8	84	8
0100-0300	87	7	70	7
0300-0500	95	7	71	7
0500-0700	148	11	108	11
0700-0900	170	13	129	12

Compared to May, the peak period appears to have broadened somewhat, about 40 per cent of spores being caught between 0700 and 1300 hours. The lowest catch remains about the same, between 1700 and 2300 hours. It is doubtful whether the differences in pattern between the two months are significant.
The mean pattern becomes (for the adjusted catches)

May and June

0900-1100	139 = 15.3%	2100-2300	37 = 4.1%
1100-1300	123 = 13.6%	2300-0100	61 = 6.7%
1300-1500	80 = 8.8%	0100-0300	66 = 7.3%
1500-1700	62 = 6.9%	0300-0500	68 = 7.5%
1700-1900	31 = 3.4%	0500-0700	91 = 10%
1900-2100	30 = 3.3%	0700-0900	117 = 12.9%

with a simplified version

(Morning)	0700-1300 = 42%	Thus roughly half the spores are caught between dawn and midday GMT, a period of rising temperature, decreasing humidity, increasing wind and solar radiation.
(Afternoon)	1300-1900 = 19%	
(Evening)	1900-0100 = 14%	
(Night)	0100-0700 = 25%	

PART 2 - Harpenden

The corresponding figures for 1971 and Plant Pathology Laboratory, (no winter barley near) were as follows:

Time of day (B.S.T.)	May		June		May and June	
	Mean catch	Percentage	Mean Catch	Percentage	Mean catch	Percentage
0900-1100	10	8	294	19	304	18
1100-1300	12	10	317	20	319	19
1300-1500	19	15	246	16	265	16
1500-1700	23	18	204	13	227	13
1700-1900	21	17	119	8	140	8
1900-2100	13	10	66	4	79	5
2100-2300	4	3	65	4	69	4
2300-0100	3	2	50	3	53	3
0100-0300	2	2	35	2	37	2
0300-0500	1	1	65	4	66	4
0500-0700	5	4	94	6	99	6
0700-0900	12	10	22	1	34	2

The simplified versions may now be compared, the percentages for the 6 hour period being:-

		Wellesbourne	Herpenden
(Morning)	0700-1300	42	39
(Afternoon)	1300-1900	19	37
(Evening)	1900-0100	14	12
(Night)	0100-0700	25	12

There are thus appreciable differences between the two diurnal patterns which cannot be explained with the evidence so far available, but it may be significant that the Harpenden trap was raised in height throughout the season to keep it level with the top of the crop. The Wellesbourne trap was maintained at approximately 50 cm height throughout, and thus in the large night values may be a reflection of the 'settlement' of the airbourne virus.

Any comments or suggestions should be sent to the author

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